

## WHAT IS CLAIMED IS:

- 1 1. A power steering system for controlling a steering of a wheel, comprising:
  - 2 1) an oil pressure cylinder including:
    - 3 i) a first oil pressure chamber,
    - 4 ii) a second oil pressure chamber, and
    - 5 iii) a piston partitioning the oil pressure cylinder into the first oil pressure  
6 chamber and the second oil pressure chamber;
  - 7 2) an oil passage including:
    - 8 a first oil passage connected to the first oil pressure chamber, for a supply and  
9 a drainage of an oil pressure, and
    - 10 a second oil passage connected to the second oil pressure chamber, for the  
11 supply and the drainage of the oil pressure;
  - 12 3) a reversible oil pump, in accordance with an input torque outputted from a  
13 steering input mechanism, supplying the oil pressure to one of the first oil pressure  
14 chamber and the second oil pressure chamber while draining the oil pressure from the  
15 other of the first oil pressure chamber and the second oil pressure chamber, thus  
16 controlling the steering of the wheel;
  - 17 4) a drain passage including:
    - 18 i) a first drain passage for draining the oil pressure from the first oil  
19 passage, and
    - 20 ii) a second drain passage for draining the oil pressure from the second oil  
21 passage;
  - 22 5) a reservoir connected to the first drain passage and the second drain passage,  
23 the reservoir reserving the oil pressure drained from the first oil passage and the second oil  
24 passage respectively through the first drain passage and the second drain passage; and
  - 25 6) a switch valve including:
    - 26 i) a first switch valve connected to the first drain passage, and
    - 27 ii) a second switch valve connected to the second drain passage,
    - 28 when one of the first oil passage and the second oil passage is so pressurized  
29 by an operation of the reversible oil pump as to have an increased internal pressure, a pair  
30 of the first switch valve and the second switch valve allowing the following:

31                    i)     closing one of the first drain passage and the second drain passage which  
32 one is connected to the oil passage having the thus increased internal pressure,  
33                    while  
34                    ii)    opening the other of the first drain passage and the second drain passage  
35 which other is connected to the oil passage that is so depressurized as to have a decreased  
36 internal pressure.

1     2.     The power steering system as claimed in claim 1, wherein  
2           the switch valve is so disposed between the first drain passage and the second drain  
3 passage as to allow the first drain passage and the second drain passage to open and close  
4 relative to each other in accordance with a differential oil pressure between the first oil  
5 passage and the second oil passage.

1     3.     The power steering system as claimed in claim 2, wherein  
2           the first switch valve includes:  
3                    a first poppet valve body for opening and closing the first drain passage, and  
4           the second switch valve includes:  
5                    a second poppet valve body for opening and closing the second drain passage.

1     4.     The power steering system as claimed in claim 3, wherein  
2           the first poppet valve body is slidably received in a first valve hole and is provided  
3 with a seal section for partitioning the first valve hole into a first chamber and a second  
4 chamber, while the second poppet valve body is slidably received in a second valve hole  
5 and is provided with a seal section for partitioning the second valve hole into a first  
6 chamber and a second chamber,  
7           the first chamber connects to the oil passage by way of the drain passage and  
8 connects to the reservoir by way of a drain passage, such that opening and closing the  
9 poppet valve body make a switching control of a connection and a disconnection between  
10 the oil passage and the reservoir, and  
11           the second chamber connects to the oil passage, and the second chamber's side of  
12 the poppet valve body is provided with a pressure applied face for allowing the oil  
13 pressure from the reversible oil pump to bias the poppet valve body to the first chamber.

1 5. The power steering system as claimed in claim 4, wherein  
2 each of the first poppet valve body and the second poppet valve body is provided  
3 with a resilient member for biasing the poppet valve body to the first chamber.

1 6. The power steering system as claimed in claim 5, wherein  
2 the power steering system further includes:  
3 1) a connection passage for connecting the first chamber of the first valve hole  
4 with the first chamber of the second valve hole, and  
5 2) a free piston slidably disposed in the connection passage, and  
6 the free piston moves substantially axially in accordance with the differential oil  
7 pressure between the first oil passage and the second oil passage, thus opening and closing  
8 the first poppet valve body and the second poppet valve body relative to each other.

1 7. The power steering system as claimed in claim 6, wherein  
2 the free piston is provided with an abutment section for pushing the poppet valve  
3 body to open the poppet valve body.

1 8. The power steering system as claimed in claim 7, wherein  
2 the abutment section abuts on the first poppet valve body and the second poppet  
3 valve body when the reversible oil pump is free from the operation.

1 9. The power steering system as claimed in claim 7, further comprising:  
2 a resilient member between the free piston and the first poppet valve body, and  
3 a resilient member between the free piston and the second poppet valve body.

1 10. The power steering system as claimed in claim 4, wherein  
2 each of the first poppet valve body and the second poppet valve body has a  
3 switching section for making the switching control of the connection and the  
4 disconnection between the oil passage and the reservoir, the switching section being  
5 shaped substantially into a cone frustum.

1 11. The power steering system as claimed in claim 4, wherein

2 the drain passage connects the first chambers with the reservoir, and  
3 on an upstream side of the reservoir, the drain passage connects the first chamber of  
4 the first poppet valve body to the first chamber of the second poppet valve body.

1 12. The power steering system as claimed in claim 4, wherein  
2 the second chamber is formed with a pair of a first opening and a second opening,  
3 the first opening connects to the oil passage on the reversible oil pump's side, while  
4 the second opening connects to an oil passage on the oil pressure cylinder's side.

1 13. The power steering system as claimed in claim 1, wherein  
2 the switch valve opens the first drain passage and the second drain passage when the  
3 reversible oil pump is free from the operation.

1 14. The power steering system as claimed in claim 1, wherein  
2 the switch valve closes the first drain passage and the second drain passage when the  
3 reversible oil pump is free from the operation.

1 15. An oil pressure circuit for controlling a steering of a wheel, comprising:  
2 1) an oil passage including:  
3 a first oil passage for a supply and a drainage of an oil pressure, and  
4 a second oil passage for the supply and the drainage of the oil pressure;  
5 2) a reversible oil pump connected to the first oil passage and the second oil  
6 passage, the reversible oil pump, in accordance with an input torque outputted from a  
7 steering input mechanism, supplying the oil pressure to one of a first oil pressure chamber  
8 and a second oil pressure chamber while draining the oil pressure from the other of the  
9 first oil pressure chamber and the second oil pressure chamber, thus controlling the  
10 steering of the wheel;

11 3) a drain passage including:

12 i) a first drain passage for draining the oil pressure from the first oil  
13 passage, and

14 ii) a second drain passage for draining the oil pressure from the second oil  
15 passage;

16           4)    a reservoir connected to the first drain passage and the second drain passage,  
17   the reservoir reserving the oil pressure drained from the first oil passage and the second oil  
18   passage respectively through the first drain passage and the second drain passage; and

19           5)    a switch valve including:

20                i)    a first switch valve connected to the first drain passage, and

21                ii)   a second switch valve connected to the second drain passage,

22                when one of the first oil passage and the second oil passage is so pressurized  
23   by an operation of the reversible oil pump as to have an increased internal pressure, a pair  
24   of the first switch valve and the second switch valve allowing the following:

25                i)    closing one of the first drain passage and the second drain passage which  
26   one is connected to the oil passage having the thus increased internal pressure,

27                while

28                ii)   opening the other of the first drain passage and the second drain passage  
29   which other is connected to the oil passage that is so depressurized as to have a decreased  
30   internal pressure.